

REMARKS

Favorable reconsideration of this application in light of the preceding amendments and the following remarks is respectfully requested. Claims 1-25 are currently pending. Claims 1-19 and 24 have been amended herein and claim 25 is a newly added claim.

Applicant wishes to thank Examiner Jackson for the courtesy of a personal interview granted to Applicant and Applicant's representative, Timothy Hsieh, on September 9, 2005. During the interview, Applicant and Applicants' representative presented arguments detailing how the technical merit to the disclosed embodiments and how the cited reference do not disclose the recited claims. Examiner Jackson indicated that he would reconsider the outstanding grounds for rejection upon formal submission of the supporting evidence and of these remarks. Accordingly, Applicant now submits in this response the supporting evidence and the remarks previously presented to the Examiner during the interview.

In the Office Action dated May 10, 2005, claims 1-24 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement; claims 1-24 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention; claims 1-4, 7-11, 16, 18-21, and 24 were rejected under 35 U.S.C. § 102(b) as being anticipated by Hack et al. '97; claims 1-11, 14, 15, and 18-24, were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over U.S. Patent 6,104,632 to Nishimura; claims 1-6 and 12-23 were rejected under 35 U.S.C. § 103(a) as being unpatentable

over U.S. Patent 4,823,177 to Prinz; and claims 1-24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hack et al. '97 or U.S. Patent 6,113,746 to Hack et al. in view of U.S. Patent 6,355,953 to Kirczenow, Lee et al., and U.S. Patent 5,565,695 to Johnson; and claims 1-24 were rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over U.S. Patent 6,113,746 to Hack et al. The rejection is traversed for the following reasons.

The rejection of claims 1-24 under 35 U.S.C. § 112, first paragraph

In the Office Action claims 1-24 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. Applicant respectfully traverses this rejection.

The Office Action asserts that “The claim(s) contains subject matter which was not described in the specification in such a way as to enable one of ordinary skill in the art . . . to make and/or use the invention. There is no enablement for spintronic devices made with spark processed silicon material.” See Office Action page 2, lines 7-11. Applicant *agrees* with this statement. Indeed, the present application is not directed towards and the claims do not recite spark-processed silicon. Further, the claims of the present application, as originally submitted and as herein amended, are directed to a magnetic material, and do not recite a spintronic device.

The Office Action goes on to assert that “There is clearly no exact blueprint . . . to make and use a spintronic device from spark processed amorphous silicon material.” See Office Action page 2, lines 15-17. Again, Applicant *agrees* with this statement. The present application is not directed towards and the claims do not recite a spintronic

device made from spark-processed amorphous silicon material. Similarly, the Office Action asserts that the present teachings do not discuss various hypothetical problems that could occur in a spintronic device made using spark-processed amorphous silicon. The primary reason for the lack of disclosure on this point is that the present application is not directed towards and the claims do not recite a spintronic device made using spark-processed amorphous silicon. As such, it is unclear why the present application is required to enable an invention that is not described in the specification nor that is recited in the claims.

The Office Action also asserts that "applicant discloses 'nanoparticle' material and there likewise is no enablement that such material forms magnetic devices as claimed." See Office Action page 3, lines 10-11. As stated above, the claims of the present application, as originally submitted and herein amended, are directed to a magnetic material, and do not recite a spintronic device.

Applicant understands that extraordinary assertions may require extraordinary proof. Thus it is understandable that the Office Action has requested examples of experimental evidence showing that the claimed materials are magnetic. To comply with this request, Applicant provides two exemplary references: Tsubaki et al. "Hall resistance hysteresis in AlGaIn/GaN 2DEG," *Physica E* 21 676-678 (2004) and Bolduc et al. "Above room temperature ferromagnetism in Mn-ion implanted Si," *Physical Review B* 71, 033302-1 to 4 (2005). Bolduc et al. specifically exclaim that "Some-what surprisingly, the fabrication of Si-based DMS via ion implantation has not been reported." See Bolduc et al. page 033302-1, col. 1, paragraph 3, lines 10-12. This statement shows that others in the community have been as surprised as the Examiner

about the magnetization described herein. It is to be noted, however, that Bolduc et al. was published at least two years *after* the filing of the present application. The magnetization described herein is just now being addressed in a field of study by many researchers, including Tsubaki et al. and Bolduc et al. in the field and Applicant's disclosure predates all of this current work.

Because the claims of the present application, as originally submitted and herein amended, are directed to a magnetic material, and do not recite a spintronic device or a spark-processed amorphous silicon spintronic device, and because Applicant has provided two examples of experimental evidence showing that the claimed materials are magnetic, Applicant respectfully submits that the current specification and claims are enabled and respectfully requests that the rejection under 35 U.S.C. § 112, first paragraph, be withdrawn.

The rejection of claims 1-24 under 35 U.S.C. § 112, second paragraph

In the Office Action claims 1-24 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants respectfully traverses this rejection.

The Office Action asserts that it is unclear what device the claims attempt to claim. As stated above, the claims of the present application, as originally submitted and herein amended, are directed to magnetic materials. The present claims do not recite a device.

The Office Action further states that claim 11 does not follow as there is no recitation of nanoparticles in claims 1, 2, or 10. Applicant has amended claim 11 to recite "wherein said nanoparticle comprises silicon" so as to comport with claim 2, from which claim 11 depends.

Applicant respectfully submits that claims 1-24 are definite and particularly point out and distinctly claim the subject matter which applicant regards as the invention. As such, Applicant respectfully requests that the rejection of claims 1-24 under 35 U.S.C. § 112, second paragraph, be withdrawn.

The rejection of claims 1-4, 7-11, 16, 18-21, and 24 under 35 U.S.C. § 102(b) as being anticipated by Hack et al. '97

Claims 1-4, 7-11, 16, 18-21, and 24 were rejected under 35 U.S.C. § 102(b) as being anticipated by Hack et al. '97. Applicant respectfully traverses the rejection.

Independent claims 1 and 18 recite a magnetic material having a conductivity in the range of between $1 \times 10^4 (\Omega \text{ cm})^{-1}$ and $1 \times 10^{-10} (\Omega \text{ cm})^{-1}$. Hack et al. '97 do not disclose or suggest a magnetic material having a conductivity in the recited range. Therefore, Applicant respectfully submits that claims 1 and 18 are not anticipated by Hack et al. Further, claims 2-4, 7-11, and 16 depend from claim 1 and claims 19-21 and 24 depend from claims 18 and Applicant submits that these claims are allowable for at least the same reasons as claims 1 and 18, respectively, as well as for their additional recitations.

The rejection of claims 1-11, 14, 15, and 18-24 under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Nishimura

Claims 1-11, 14, 15, and 18-24 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Nishimura. Applicant respectfully traverses this rejection.

Nishimura discloses a CoFeB magnetic thin film. Claims 1 and 25, however, recite a magnetic material that does not contain Co or Fe. As such, Nishimura does not anticipate claim 1 of the present application. Similarly, claims 1 and 25 specifically exclude Co or Fe from the magnetic material. As such, it would not have been obvious to remove Co and Fe from Nishimura's CoFeB because this would leave only B. Accordingly, Applicant respectfully submits that claims 1 and 25 are allowable over Nishimura at least because Nishimura contains Co and Fe. Claims 2-17 depend from claim 1 and Applicant submits that these claims are allowable for at least the same reasons as claim 1 as well as for their additional recitations.

Claim 18 recites a semiconductor selected from Si, Ge, and SiGe, wherein the semiconductor displays ferromagnetic behavior. Nishimura does not disclose a semiconductor selected from Si, Ge, or SiGe. Accordingly, Applicant respectfully submits that claim 18 is allowable over Nishimura. Claims 19-24 depend from claim 18 and Applicant respectfully submits that these claims are allowable for at least the same reasons as claim 18 as well as for their additional recitations.

The rejection of claims 1-6 and 12-23 under 35 U.S.C. § 103(a) as being unpatentable over Prinz et al.

Claims 1-6 and 12-23 were rejected under 35 U.S.C. § 103(a) as being obvious over Prinz et al. Applicant respectfully traverses this rejection.

Prinz et al. discloses a common dilute magnetic II-VI based semiconductor where the magnetic behavior results from transition metals such as Cr, Mn, Fe, Co, or Ni.

Claims 1 and 25, however, recite a magnetic material that does not contain Cr, Mn, Fe, Co, or Ni. As such, it would not have been obvious to remove Cr, Mn, Fe, Co, or Ni from Prinz et al.'s dilute magnetic II-VI based semiconductor. Accordingly, Applicant respectfully submits that claims 1 and 25 are allowable over Prinz et al. at least because Prinz et al. relies on Cr, Mn, Fe, Co, or Ni to obtain the magnetic behavior. Claims 2-17 depend from claim 1 and Applicant respectfully submits that these claims are allowable for at least the same reasons as claim 1 as well as for their additional recitations.

Claim 18 recites a semiconductor selected from Si, Ge, and SiGe, wherein the semiconductor displays ferromagnetic behavior. Prinz et al. does not disclose a semiconductor selected from Si, Ge, or SiGe. Accordingly, Applicant respectfully submits that claim 18 is allowable over Prinz et al. Claims 19-24 depend from claim 18 and Applicant respectfully submits that these claims are allowable for at least the same reasons as claim 1 as well as for their additional recitations.

The rejection of claims 1-24 under 35 U.S.C. § 103(a) as being unpatentable over Hack et al. '97 or '746 in view of Kirczenow, Lee et al. and Johnson

Claims 1-24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hack et al. '97 or '746 in view of Kirczenow, Lee et al. and Johnson. Applicant respectfully traverses the rejection.

The rejection of claims 1-24 over over Hack et al. '97 or '746 in view of Kirczenow, Lee et al. and Johnson discusses spin transistors. As detailed above, however, none of claims 1-24 or claim 25 recites a spin transistor. Moreover, Kirczenow, Lee et al. and Johnson do not correct the deficiencies described above for the rejection of claims 1-24 over Hack et al '97 or '746. As such, Applicant respectfully submits that claims 1-24 and 25 are allowable over Hack et al. '97 or '746 in view of Kirczenow, Lee et al. and Johnson.

The rejection of claims 1-24 under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Hack et al. '746

Claims 1-24 where rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Hack et al. '746. Applicant respectfully traverses this rejection.

The Office Action asserts that Hack et al. '746 teaches an amorphous silicon magnetic layer with n or p type dopants at col. 3, lines 54-56. However, Hack et al. state that the ferromagnetic layer is formed on p-type, n-type, low-doped, high-doped, or undoped silicon wafers. See Hack et al. col. 3, lines 54-56. There is no disclosure or

suggestion of incorporating a dopant into a semiconductor to adjust the semiconductor conductivity, where the semiconductor displays a ferromagnetic behavior.

Further, claims 1 and 18 recite a magnetic material that has a conductivity in the range of between $1 \times 10^4 (\Omega \text{ cm})^{-1}$ and $1 \times 10^{-10} (\Omega \text{ cm})^{-1}$. Similar to that which is stated above, Hack et al. '746 do not disclose or suggest a magnetic material having a conductivity in the recited range. Therefore, Applicant respectfully submits that claims 1 and 18 are not anticipated by or obvious over Hack et al. '746. Further, claims 2-4, 7-11, and 16 depend from claim 1 and claims 19-21 and 24 depend from claims 18 and Applicant respectfully submits that these claims are allowable for at least the same reasons as claims 1 and 18, respectively, as well as for their additional recitations.

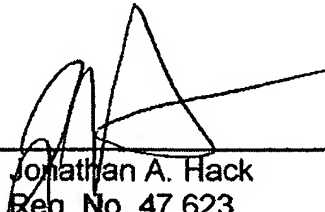
In view of the foregoing remarks, Applicant respectfully requests the reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to the Deposit Account 50-2961.

Respectfully submitted,

Dated: November 10, 2005

By:



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